U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis*

COMMON NAME: Kopiko

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: July 2005

STATUS/ACTION

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

__X_ Continuing candidate

___ Non-petitioned

_X__ Petitioned - Date petition received: May 11, 2004

_ 90-day positive - FR date:

_X_ 12-month warranted but precluded - FR date: May 11, 2005

_N_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? _yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? _yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 1997

___ Candidate removal: Former LP: __

___ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Rubiaceae (Coffee family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Oahu

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Oahu

LAND OWNERSHIP: The individuals of *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* are located on lands owned by the State of Hawaii and managed for public hunting of game birds and mammals.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* can be a tree or shrub up to 6 meters (m) (19.7 feet (ft)) tall. Leaves vary from membranous to leathery and have small, inconspicuous domatia. Flowers are unisexual and have white corollas. This variety is distinguished from the other varieties of this subspecies by the fruit being broadly ellipsoid and 8 to 15 millimeters (0.3 to 0.6 inches) long (not including the persistent calyx tube) (Wagner *et al*. 1999a).

Taxonomy *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* was originally described Degener and Fosberg. This variety is recognized as a distinct taxon in Wagner *et al*. (1999a) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat This taxon occurs in mesic and wet forests at elevations between 360 and 1,250 m (1,200 and 4,100 ft) (Wagner *et al*. 1999a).

Historical and Current Range/Current Status The historic range of *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* included the once abundant mesic and wet forests of the Koolau mountains on the island of Oahu. *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* is currently known from three populations totaling less than 20 individuals (Wagner *et al*. 1999a; Kapua Kawelo, U.S. Army, pers. comm. 1999; Ane Batukis, Oahu Genetic Safety Net Program, pers. comm. 2005). The two other varieties of this subspecies, *hosakana* and *rockii*, are no longer extant.

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.
This variety is highly and imminently threatened by feral pigs (*Sus scrofa*) that degrade and destroy habitat (Joel Lau, Hawaii Natural Heritage Program, pers. comm. 1996). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitat on Oahu and four other islands. Pigs are currently present on Oahu, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Feral ungulates trample and eat native vegetation and disturb and open areas. This causes erosion and allows the entry of alien plant species (Smith 1985; Stone 1985; Medeiros *et al*. 1986; Scott *et al*. 1986; Tomich 1986; Cuddihy and Stone 1990; Wagner *et al*. 1999a). No known conservation measures have been taken to date to address this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.
Observable damage to fruits of *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* indicate that rats may eat the fruits of this taxon, thus reducing the number of seeds available for regeneration (Bakutis *et al.* 2005). Of the four species of rodents that have been introduced to the Hawaiian Islands, the species with the greatest impact on the native flora and fauna is probably *Rattus rattus* (black or roof rat), which now occurs on all the main Hawaiian Islands. Black rats, and to a lesser extent *Mus musculus* (house mouse), *R. exulans* (Polynesian rat), and *R. norvegicus* (Norway rat), eat the fruits of some native plants, especially those with large, fleshy fruits. Many native Hawaiian plants produce fruit over an extended period of time, thus producing a prolonged food supply for rodent populations. Black rats strip bark from some native plants, and eat the fleshy stems and fruits (Tomich 1986; Cuddihy and Stone 1990). No known conservation measures have been taken to date to address this threat.

D. The inadequacy of existing regulatory mechanisms.
Pigs are managed in Hawaii as game animals, but many populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers. Pig hunting

is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Lands and Natural Resources n.d.-a, n.d. b, n.d.-c). However, public hunting does not adequately control the number of ungulates to eliminate this threat to native plant species. No known conservation measures have been taken to date to address this threat.

E. Other natural or manmade factors affecting its continued existence.
Psychotria hexandra ssp. *oahuensis* var. *oahuensis* is threatened by alien plant species that compete with it and degrade habitat (J. Lau, pers. comm. 1996).). The original native vascular flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a).) Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux et al. 1998) indicate nonnative plant species may outcompete native plants similar to *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis.* Competition may be for space, light, water or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Medeiros *et al*. 1992; Loope and Medeiros 1992; Ellshoff *et al*. 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al*. 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al*. 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to that of *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis,* the Service believes nonnative plant species are a threat to this species. No known conservation measures have been taken to date to address this threat.

In addition, plants like *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* that are endemic to single small islands are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by genetic bottlenecks, random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks. Flash flooding and landslides may also be a threat to this species, since at least one population is located in a narrow valley with steep walls (A. Bakutis, pers. comm. 2005). When considered on their own, the natural processes associated with being a single island endemic and the habitat perturbation caused by hurricanes do not affect *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss for human development or predation by alien species. No known conservation measures have been taken to date to address these threats.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED
The Service is working with interested individuals, organizations, and agencies to protect highly threatened species on Oahu, including *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis*. The Service has provided funding over the last three years through fiscal year 2006 to collect seeds for genetic storage and for small-scale on-site management to prevent extinction. Collections were made from one individual in 2005 (Bakutis *et al*. 2005).

SUMMARY OF THREATS

The major threats to this species include pigs, rats, and nonnative plant species, which are believed to be a major cause of the decline of the species. No on-the-ground conservation efforts have been initiated but are in the planning stages. One individual is currently represented in an *ex situ* collection.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	2
		Subspecies/population	**3***
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

This subspecies is highly threatened by feral pigs and rats that directly prey upon it and degrade and destroy habitat, rats that consume its fruit, and nonnative plants that compete for light and nutrients. Threats to the mesic to wet forest habitat of *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* and to individuals of this species occur throughout its range and are expected to continue or increase without control or eradication. The low numbers of individuals and limited range also increase the risk of extinction risk to this species from the existing threats, as well as from stochastic events. Small-scale conservation efforts are in the early planning stages to remove the most immediate threats, including pigs, rats, and nonnative plants.

Imminence:

Threats to *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* from feral pigs, rats, and nonnative plants are imminent because they are ongoing.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for

emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, the Service has provided funding over the last three years through fiscal year 2006 to collect seeds for genetic storage and for small-scale on-site management to prevent extinction. Collections were made from one individual in 2005. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *Psychotria hexandra* ssp. *oahuensis* var. *oahuensis* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:
Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and was updated by personal communication with Joel Lau of the Hawaii Natural Heritage Program in 1996 and Kapua Kawelo of the U.S. Army Environmental staff in 1999. We have incorporated additional information on this subspecies from our files and from the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. No new information was provided. In 2005 we contacted the species experts listed below and Ane Bakutis, Oahu Genetic Safety Net Program, provided new information based on surveys she conducted this year.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Rare (could be at risk) by Wagner *et al*. (1999b).

This level of monitoring is appropriate to update the status of the species, since the populations are being monitored in detail by the Oahu Genetic Safety Net coordinator several times a year and the results are included in this assessment.

COORDINATION WITH STATES
In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED
List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program

2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	June 28, 2005	National Tropical Botanical Garden
9. Ken Wood	June 28, 2005	National Tropical Botanical Garden
10. Ane Bakutis*	June 22, 2005	Oahu Genetic Safety Net Program
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

*Provided new information on this taxon in 2005

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004

Other resources utilized:

Bakutis, A., J. Ryder, M. Kier, D. Sailer, and K. Wong. 2005. Hawaii Rare Plant Recovery Group Rare Plant Field Data Form, May 1, 2005.

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai`i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.

Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.

Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.

Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvescens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap.48: 23-36.

Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.

Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept. 59:1-230.

Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvescens* D.C. (Melastomataceae). Journal of Biogeography 23: 775-781.

Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.

Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9:1-429. Cooper Ornithological Society, Los Angeles.

Smathers, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai`i. Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park, pp. 274-288.

Smith, C.W. 1985. Impact of alien plants on Hawai`i's native biota: *In* Stone, C.P., and J.M. Scott (eds.), Hawai`i's terrestrial ecosystems: preservation and management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.

Tomich, P.Q. 1986. Mammals in Hawai`i: A synopsis and notational bibliography. Bishop Museum Press, Honolulu. 375 pp.

Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnanek, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. New Zealand Journal of Ecology 21(1): 1-16.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a. Manual of the Flowering Plants of Hawai`i, Bishop Mus. Spec. Publ. 97:1-1918. University of Hawaii Press and Bishop Museum Press, Honolulu.

Wagner, W.L., M.M. Bruegmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Mus. Occas. Pap. 60: 1-58.

Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai'i, version 3.1. December 12, 2003. Available from the Internet. URL: http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm.

Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: Acting _____ 11/16/05
Regional Director, Fish and Wildlife Service Date

_____

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: September 20, 2005
Conducted by: Marie M. Bruegmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 27, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 13, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 13, 2005
Field Supervisor